

MONEYCHANGERS, PRIVATE INFORMATION AND GRESHAM'S LAW IN LATE MEDIEVAL EUROPE*

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RESUMEN

En este artículo retomamos una vieja explicación de la Ley de Gresham, que descansa en el tráfico de monedas protagonizado por los cambistas. Centrándonos en la Edad Media, presentamos materiales que sugieren que los cambistas hacían uso de la información privilegiada de que disponían en relación con el dinero, para hacer beneficios a través de operaciones de arbitraje y de retirada de la circulación de las mejores monedas. En ambos casos, su actividad daba como resultado la desaparición parcial –y a veces total– de las monedas infravaloradas.

Palabras clave: dinero, información, Gresham, cambistas

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ABSTRACT

In this paper we revive an old explanation for Gresham's law that rests on the trafficking of coins by moneychangers. Focusing on the late Middle Ages, we present material suggesting that moneychangers used their private information on money to make profit through billonage and arbitrage operations. In both cases their activity led to the partial –sometimes total– disappearance of the undervalued coins.

Keywords: money, information, Gresham, moneychangers

JEL Classification: D82, E42, N22

1. INTRODUCTION

There is not much agreement on the theoretical underpinnings of the Gresham's law. It has been advocated that Gresham's law applies only when there exists a fixed exchange rate between two different currencies. If buyers cannot obtain a premium when paying with the good (undervalued) currency, they would prefer to hold on to it or to use it for other purposes. It is therefore the fixed exchange rate that is supposed to trigger Gresham's law¹.

This view was recently challenged by Rolnick and Weber (1986). They argue that past monetary institutions made it difficult to believe that Gresham's law could have ever been relevant. Firstly, a fixed exchange rate policy at the mint would have led to unbounded profits for money traders, and the ruin of the mint. Secondly, it is hard to believe that any sovereign was strong enough to enforce such a policy. They conclude that the law is fallacious and should be replaced by another one which would stress the transaction costs associated with the use of a non-par currency: par money drives out non-par money when the costs of using it at its non-par value –rounding, monitoring, strict legal tender laws– are too high. Were these transaction costs not too high, price adjustments would naturally take place, instead of the good money being driven out.

In Rolnick and Weber's argument, it is supposed that the buyer and the seller are well informed about, firstly, the quality of the good to be exchanged, and secondly, the quality of the coins to be offered in payment. What would happen if the quality of the coins could not be known? Is it still possible to bargain a

¹ Friedman and Schwartz (1963) p. 27, note. See also the article on Gresham's law by Bernholz and Gersbach in the *Palgrave*. This argument was extensively advocated by monometallists during the bimetallist controversy of the second half of the 19th century.

premium, regardless of the transaction costs, when it is difficult to tell the true nature of a coin? Presumably, the role played by information in a world of commodity money must be of primary importance to understand the pattern of monetary circulation².

The goal of this article is to re-examine Gresham's law by examining how the circulation of money in the Middle Ages was affected by imperfect information on coins. It provides an alternative to the legal tender explanation: a compulsory fixed exchange rate may not have been the only cause of Gresham's law; private information held by money experts played a crucial role in activating the driving out of the good coins, but in a different way. The great variety of coins, the imperfect coinage technique, frequent mutations, wear, the poor communication network, all these factors made it difficult for one type of coin to have a single price and a stable intrinsic content. Our thesis is that this imperfect information on coins was the source of large profits for people who invested in gathering knowledge on money –the moneychangers– and that their activity most of the time led to the driving out of the undervalued currencies.

Moneychangers appeared in the middle of the 12th century and were widespread all over Europe by the 13th century. In the Middle Ages, the intrinsic content of the coins and their prices in various cities were difficult for most people to assess. Moneychangers specialized in gathering and selling information on money. As we shall see, they could make use of their knowledge to make profit through two simple operations. Firstly, by comparing the intrinsic content of two supposedly identical coins, then paying with the bad and keeping the heavier ones. This is known as *billonage*. Secondly, by taking out the coins that were undervalued out of one place and bringing them where they were relatively overvalued. This is known as *arbitrage*. Many moneychangers were in fact caught culling the best coins and transporting moneys or bullion from one city to another. In both cases their work resulted in the disappearance of the good coins, i.e. the undervalued ones.

This opinion is supported by several contemporary writings, from both scholars and professionals. They held moneychangers responsible for the driving out of good currencies. Although we should be cautious when reading the quotations blaming all evils on moneychangers, this accusation is observed on many occasions: in the written residues of the doctrine, in several ordinances and in court reports on monetary disorders. The goal of this article is to explore these

² Akerlof has used Gresham's law as an illustration of his lemons' problem. For models of Gresham's law based on the information problem, see Aiyagari (1989) and Velde, Weber and Wright (1999). For models providing a different explanation see Barro (1979), Dutu (2002), Li (2002), Sargent and Smith (1997), Selgin (1996), and Camera, Craig and Waller (2004).

texts and to show how they support an information-based version of Gresham's law³.

The article is organized as follows. Section 2 reviews the institutions of the medieval monetary system and the role played by moneychangers. Section 3 and 4 quote and comment, respectively, the accusations of billonnage and arbitrage made on moneychangers. Section 5 discusses how asymmetric information and legal tender laws prevented the currency market to adjust through prices and how some well-advised sovereigns instrumentalized this. Section 6 concludes.

2. «CHANGERS AND MEN COMPETENT IN THE KNOWLEDGE OF SILVER AND WEIGHT»

2.1. An overview of the system

During the Middle Ages, money was very complex due to the concurrent circulation of many types of coins, and the use of several moneys of account. Prices were expressed in moneys of account. But payments were settled in coins. Their value in terms of units of account was neither always explicit nor stable.

The most common coins consisted of the local silver penny stemming from the Carolingian *denier*⁴. Black money or petty coins were also common. Between the end of the Carolingian era and the 13th century, all the rulers –also ecclesiastics– who had a mint, struck these two kinds of money on a regular basis. They circulated within the fief and sometimes its surroundings⁵.

At the upper level, we find the moneys of the kings. In France, since the time of Saint Louis, coins struck in the king's mints were legal tender throughout the territory of his vassals, and local coinage started to disappear little by little. At the beginning, these royal moneys were large silver coins, especially the silver groat, a multiple of the penny, or the English sterling.

Gold coins, after a six-century break of coinage, were struck again on a regular basis from the end of the 13th century by Italian commercial cities: Florence, Venice and Genoa. This last type of real money, including florins, was commonly used in

³ Gresham's law was not a finding of Sir Thomas Gresham. Nor was he the inventor of the saying that «bad money drives out good money». Actually, it is Henry D. Macleod, a 19th century Scottish economist, who misattributed the law to Gresham. And it is Jevons who forged the now famous adage a few years later. A detailed discussion of the chaotic birth of Gresham's law can be found in Fetter (1931).

⁴ *Denier* in France, *denari* in Italy, *Pfennige* in Germany.

⁵ See, for instance, Castaing-Sicard (1961) for a case study of Languedoc seigniorial coinage.

international business and soon acquired a reputation for stability. Sometimes, rulers prohibited the circulation of these foreign coins on their territory, as was the case in 14th century England. Many decrees regularly stipulated that foreign coins could not be accepted in payment and that they were to be exchanged for domestic coins, at a rate fixed by the ruler⁶.

Besides these real moneys, of which there were many, there were several moneys of account in pounds or *livres*, shillings or *sous*, pennies or *deniers*. They were not used in payment but as a measure of value and to keep accounts. They could be different according to regions. For example, four *livres parisis* were worth five *livres tournois*. Most of the time, these moneys of account were old real demonetised currencies that continued to serve for accounting purposes. Each real money was priced in terms of moneys of account.

By the end of the Middle Ages, the production and circulation of money revolved around three entities: 1) the mint overseen by a master; 2) legal tender laws and monetary ordinances governing the minting policy and the exchange rates; 3) the moneychangers, who formed the link between the public and the mint⁷. The ruler would specify the type and the characteristics of the coins to be struck. The type of a coin corresponded to its design and iconography. The characteristics corresponded to its fineness, weight and legal tender value⁸.

The type and the intrinsic content –weight and fineness– were regulated by a first decree, which was sent to the Mint Master alone. A second decree, which was published and cried out, stated the value in units of account of the newly issued coins. This second decree often cried down some former coins and also provided the exchange rates for several foreign coins. From the 13th century onwards the Mint Master was increasingly more often designated by the ruler. He may have been involved in money changing at times, but this was normally the prerogative of moneychangers.

2.2. Moneychangers in late medieval Europe

In the medieval metallic system, the true quality of a coin was a continuous concern. People started as early as 1050-1100 to specify in contracts the kind of currency to be used, and which mint they came from⁹. Moneychangers came on

⁶ In other places, like Belgium, these strong currencies were authorized from the beginning of their coinage.

⁷ De Roover (1948, p. 220).

⁸ See Rolnick, Velde and Weber (1996) for a clear-cut presentation of how these three components linked together.

⁹ Duby (1961).

the scene a bit later, by the times of the Commercial Revolution. They appeared all over France from the mid-13th to the mid-15th centuries¹⁰. In Paris, this commerce was mentioned as early as 1141.¹¹ This is certified by an act of Louis VII from December 28th, 1140. It confirms and settles for perpetuity money changing at the abbey of Nôtre-Dame-de-Saintes¹². In a new act of the year 1141, Louis VII decided that the exchange of his money must always take place on the Grand Pont in Paris; that nobody would be allowed to effect change transactions in Paris at a place other than the stalls on the Grand Pont; and that those who wished to be authorized would have to pay an annual tax of 20 sous¹³. Various decrees from Philip the Fair confirm the exclusivity granted to the moneychangers for currency operations.

Moneychangers played a central role in the city and in exchange. Their work was composed of several activities. Firstly, to exchange large denomination coins for small denomination ones, and cried down coins for authorized ones. Moneychangers were thus the main metal suppliers for the mints, thanks to the metal gathered through their activity¹⁴. Sometimes they changed moneys from adjacent cities although there is surprisingly little evidence that they did so¹⁵. They held a bench, a shed or a table of exchange to do their job. Their tools were very expensive, generating a strong entry cost¹⁶. In Paris, their training lasted three years and good references were needed to become one of them. Sometimes moneychangers also took deposits and lent money. Most of them were located in commercial places, important trade cities and fairs. Their number is linked to the total population of the city. There were 20 moneychangers in Bruges in 1308, 23 in Tours in 1344, 39 in Chartres by the end of the 13th century, and 84 in Toulouse in 1337¹⁷.

It is important to stress that the profession was not uniform. Its legal position varied widely from one country to another, or even from town to town. For some moneychangers, their work was scrupulously supervised by the ruler, who fixed every bilateral exchange rate. It was then virtually a public office, as in Paris or Bruges. Their job was to apply the fixed exchange rates and they received a payment for that. In Bruges, for instance, there was no free entrance into the profession.

¹⁰ Chevalier (1973, p. 153).

¹¹ Landry (1910, preface, p. XIV).

¹² Luchaire (1885, p.120).

¹³ *Ibidem*, p.126.

¹⁴ See for example the studies by Bigwood (1921-1922), Favreau (1964), and Guerreau (1974).

¹⁵ Spufford (1986).

¹⁶ Chevalier (1973, p. 155) presents an opposite viewpoint, based on a study by M. Boudet on the Auvergne Region, writing that the equipment was not expensive: 6 livres, 5 sous, 6 deniers for the entire outfit, including the tent.

¹⁷ Chevalier (1973, p. 154).

Money changing was the monopoly of a small group. Four of the offices were hereditary fiefs, called the four free originals, whereas the other moneychangers were licensed. Their statutes shielded the moneychangers from competition from both inside and outside the community¹⁸. In some other places, moneychangers were free to do as they wanted to. Their earnings came from their daily transactions rather than from some exogenous salary. This was the case for 14th century Tuscan moneychangers, as well as for many itinerant moneychangers. International bankers, like the Peruzzi, who operated credit and *cambio* through bills of exchange, also belonged to this second group, as they were free¹⁹. In Brussels also, the situation was quite different from that in Bruges. The only restriction for moneychangers was a payment of a fee to the Duke and to the City. In Liege, money changing was a brotherhood of unlimited members.

Thus, some moneychangers were relatively wealthy, high-ranking civil servants, deeply invested in domestic political life. Others were independent, yet well integrated in the trade routes. Some were small businessmen, not rich, not well documented on monetary affairs²⁰. Some of them were seeking the slightest opportunity for profit while others were simply, passively, applying the royal decrees.

Even when they were fully licensed official moneychangers, many of them could make use of their private knowledge on money to make profit. They could use their private information about the intrinsic content of the coins for instance. They could also exploit the differences between prices for the same coin between two cities.

3. GUILTY OF PICKING, CLIPPING AND SORTING OUT THE HEAVIER COINS

In the medieval metallic system, two supposedly identical coins often turned out to have different intrinsic content. There were at least four reasons for this: the wear of coins, clipping, debasements by the sovereign and the imperfect coinage

¹⁸ This prohibition applied only to manual exchange, but not to dealing in bills of exchange. The job was open to women. For information about 14th century Bruges moneychangers, see De Roover (1948).

¹⁹ We are here mainly interested in manual moneychangers. Manual exchange was dominant, even in the most economically developed regions. Spufford (1986) distinguishes between four types of exchange: manual exchange, official exchange, exchange through bills and exchange to set up accounts. Manual exchange greatly dominates in number in the transactions recorded by Spufford.

²⁰ See Bompaire (1987) for the case study of a 14th century Langdocian moneychanger who lacked rigor in his research on the alloy of coins, and made numerous mistakes in the pricing.

technique. The difference between two coins was not easy to detect, however, and only experts were able to distinguish between them and to exploit the information. What were the consequences of this billonnage for monetary circulation?

Suppose we have two pennies of the same type but with different intrinsic contents. This situation could occur, for instance, if the ruler decided to weaken the quality of newly coined pennies without crying down or paying a premium on the old ones. From 13th century onwards, debasements were widespread in Europe²¹. When the debasement was unofficial, only the Master of the Mint knew about it. He had to pledge never to disclose the information. If the secret was kept and the weakening was not too obvious, nothing happened until the secret was disclosed. But the mint masters and moneychangers worked closely together. The secret of the weakening could not be kept very long²².

The outcome of the difference could be twofold. Either there could be a price adjustment, with moneychangers for instance paying a premium on the best coins. Alternatively, there could be a quantity adjustment, which consisted in withdrawing the best coins and paying with the bad. However, even if moneychangers were allowed to price two supposedly identical coins differently, they had no interest in doing so. Since buyers could not tell the coins apart, moneychangers would take advantage of the situation and sell both of them at the same price. It was undoubtedly advantageous for them to accept a good coin at the price of a bad coin, and to pay with bad coins when asked to make change for a good one. Thus, quantities would be adjusted rather than prices as the heavier coins were taken out of circulation.

Contemporary writers frequently cited the role played by moneychangers in the disappearance of the best coins. Hostiensis (1190-1271), a 13th century decretalist, must have been one of the first to blame them: «Money is defrauded by changers who weigh coins one by one and keep the heavier ones, have them melted down, and allow the other ones to pass»²³. The same condemnation is to be found again three centuries later in the writings of Copernicus. Commenting on the changes in money carried out by the King of Poland, he wrote:

«As long as Prussian currencies have such vices, only goldsmiths and those specialized in precious metals take advantage of our misfortune. They sort out ancient coins, melt them again and then sell them to the silverer, always receiving from inexperienced persons more money with the same

²¹ See Landry (1910) or Rolnick, Velde and Weber (1996). Note that the wear of coins or clipping generated the same gap.

²² As noted by Bigwood (1921) on Belgium, previous moneychangers were often elected as mint master and vice versa.

²³ Velde (2001, p. 28).

amount of money. When older coins have almost disappeared, they choose the best from the rest and just leave the worst currencies²⁴.»

A few pages before he adds in a formulation very close to Gresham's law:

«If it is not proper to introduce a new and good currency when the old one is bad and still circulating, it is even much worse to introduce, besides a former currency, a new weaker one. The new currency not only depreciates the former, but also violently forces it out²⁵.»

These few quotations seem to show that bad money driving out good money was a known phenomenon in the late Middle Ages, and moneychangers were regarded as liable for this disorder. This version of Gresham's law is also confirmed by several monetary ordinances and court reports. Charles IV, in a monetary ordinance of December 1325 concerning the change in Rouen, stated that:

«We have got sufficient information that great troubles to us and others have been done [by unofficial moneychangers] in clipping florins and other moneys, and in accepting and putting into circulation bad and forbidden coins, and the ones from another type²⁶.»

Brants reports a similar statement by a Mint Master: «Good money is driven out and the exchange and the Lombard take all the good gold and pay in the new currency²⁷.»

Sometimes moneychangers were themselves the origin of the varying intrinsic content between two coins of the same type. In 1476, in the city of Poitiers in central France, while the King had long been working to reassert his power over moneychangers, the goldsmith Raoul Bricheteau was prosecuted by the Court of Money for clipping gold crowns. The court stated on that occasion that Raoul Bricheteau did so habitually²⁸. In Belgium, forbidden money was found in the hands of a moneychanger²⁹. Sometimes they were even caught bringing counterfeited coins into circulation³⁰.

²⁴ Copernic (1526, p. 63).

²⁵ *Ibid.* (p. 57).

²⁶ Ordonnance touchant les changes de Rouen.- Ordonnances des roys de France de la troisième race...- t. I.- Paris: Impr. Royale, 1723.- p. 789-790. See www.ordonnances.org/regnes/charles4/index.html

²⁷ Brants (1881, p. 56).

²⁸ It did not prevent the Court from delivering him the documents needed for changing money, without any guarantee. See Favreau (1964).

²⁹ Bigwood (1921, p. 427).

³⁰ Numerous examples can be found in Bigwood (1921), including Brussels, Malines or Bois-le-Duc: See pp. 429 and 623. De Roover (1948, p. 184) sustains a different point of view for Bruges moneychangers: «They were also too rich and too solicitous of their social and professional prestige to venture foolhardily their lives, their wealth, and their reputation in a criminal enterprise».

According to Dumas-Dubourg's study of early 15th century Burgundy's money, billonnage was also frequent in this part of France. The mints' books of account bemoan the sorting out of coins by simple merchants. As the intrinsic content of coins started to become public information, moneychangers were no longer the only ones to carry out the business of picking and sorting out. Like moneychangers, merchants started weighing the coins, putting aside those worth the most, melting them down and getting profit from them. In a court report it is noted that:

«De Huguenin Pelletier, from Cusery, and his son Jehan Pelletier, both merchants, because they have confessed that they have received several pennies from which they took the best and the strongest and brought them oftentimes to the Mint of Cusery to make profit [...]»³¹

As moneychangers lost their private information, the trafficking of money spread out among all the economic agents. Guerreau reports the following:

«We have heard that several changers, bullion transporters, haberdashers, innkeepers, grocers, merchants and some other subjects of milord have carried or had someone carry, and still carry every day a big amount of gold or silver out of the Realm into the earldom of Savoy and into some other countries, causing great damage to our money.»³²

When the differences between coins started to be public information, moneychangers were no longer the only ones to glean money from billonnage. However, paying a premium on good money became an equally probable outcome. It is here that Rolnick and Weber's transactions costs enter the scene to select between price or quantity adjustments. Enforced legal tender laws were also very efficient in activating Gresham's law.

4. GUILTY OF ARBITRAGE

In the heterogeneous medieval supply of money, there existed a second means to make profit for well-informed people. Rather than different intrinsic contents,

³¹ «De Huguenin Pelletier, de Cusery, et Jehan Pelletier son fils marchans, lesquels, pour ce qu'ilz ont confessé que, ou fait de leurs marchandises, ilz ont receu plusieurs deniers desquelz ilz ont prins les meilleurs et les plus fors et les ont porté souventeffois à la monnoye de Cusery pour en avoir prouffit et aussi à plusieurs autres foiz par plusieurs marchans dont ilz ont eu de grans prouffits [...]» Archives de la Côte-d'or, quoted by Dumas-Dubourg (1988, p. 177).

³² «Ils sont tenuz de les Et il soit venu à nostre connaissance que plusieurs changeurs, porteurs de billion, merciers, taverniers, espiciers, marchands et autres noz subgetz ont porté ou fait porter et font chacun jour hrs de nostre royaume en la Comté de Savoie et en plusieurs autres pays de l'Empire et ailleurs, grant quantité de billion tant d'or comme d'argent, en éloignat et délaissant nos monnaiyes ausquelles porter». Guerreau (1974).

profit was based on varying valuations for one type of coin in two different places. Suppose, for instance, that a florin had a higher price in the city of Mâcon than in Lyon. Most probably, if the cost of transportation was not too high, those who were aware of that difference would make some profit simply by buying where the florin was cheap (Lyon) and selling where it was expensive (Mâcon). As a result, florins would then become relatively scarce in Lyon and start to be relatively more abundant in Mâcon. Comparing the prices of money at different places made it possible to make profit on money. This profit opportunity, which is pure arbitrage, came from the non-uniformity in the prices of coins at the regional level³³.

As for the billonage activity, moneychangers were blamed for that activity. Oresme, commenting Aristotle's *Politics*, noted that one of the origins of the *art pecuniativa* is that: «[...] some have noticed that [money] is worth more in one place than in others³⁴.» In his *Traité des Monnoies* he states: «Men are willingly carrying their money to places where they think it is worth more³⁵.»

During the late Middle Ages, this kind of transportation was observable on many occasions. La Roncière's work on the book of account of a mid-14th century Florentine moneychanger, Lippo di Fede del Sega, provides a lot of information on this kind of arbitrage. The main activity of this moneychanger was the trafficking of coins between different places: buying money where it was cheap and selling where it was expensive. He sometimes used correspondents but most of the time he moved around himself with his own bag of coins. His journeys took a few days or weeks, and his profits came from two sources: speculation on currency rates and, more significantly, arbitrage operations on various currencies –florins, groats, petty coins– between different markets –Florence, Sienna, Venice, etc.

Let us describe some of his operations. Silver coins, in the late 1330s, were quoted higher in Venice compared to anywhere else in Northern Italy. This premium fostered an influx of silver coins, first groats then a series of debased coins, which eventually restored the price balance. Lippo took part in this arbitrage trade. He bought *grossi* in a place kept secret, probably Florence³⁶. He brought some to Venice, either personally or by working with different businessmen. Hard currency was brought in, and never bills of exchange. Once they got to Venice, he sold them for florins that he would repatriate later on. To that end, he called on Bono Filippi and two other partners of large trading companies located in Venice in 1315.

³³ This basic arbitrage was also frequently observed for the relative price of gold to silver. See Bautier (1951) and the work of Munro.

³⁴ Oresme, in Dupuy (1989, p. 102).

³⁵ *Ibid*, p. 76.

³⁶ A *grosso*, or groat, is a silver coin of very fine alloy minted at a value of twelve deniers at its beginning. It appeared at the beginning of the 13th century in Italian cities such as Venice, Florence and Lucca. These groats were then replaced by debased groats named differently so as to be distinguishable: *grosso da sei*, *grosso da venti*, *grosso da trenta*, etc.

Repatriation was done through conventional bills of exchange, stipulating that the head office of these companies would pay in florins to Lippo or a third party designated by him the amount he had given them in *grossi*.

According to Lippo's book of account, there were many such opportunities of arbitrage during that time in Tuscany: between 1313 and 1316, the maximum value of the florin was 60 sous in Florence, 59 in Pisa and 58 in Siena. In 1317, silver coins were more valuable in Siena, so he went there six times. There, he sold *grossi* and silver coins for 2,771 florins. In chapter 2 of his book, La Roncière gives details about one transaction: «Lippo takes from Florence cried down silver Florentine coins (*popolini*) worth 453 florins. He sells them in Sienna at a slightly higher price –459– florins that he takes back with him. He has made a profit from the higher value of large Florentine coins in Siena». In 1317-1318, he went to Pisa fourteen times where he changed a total of 4,097 florins³⁷. Some of his transactions were even more complex, combining differences not only in exchange rates but also in seigniorage levels between mints³⁸. Sometimes, certain operations were unsuccessful. Practical difficulties could arise, notably from concerned authorities that prevented the flows of metals toward foreign countries.

In Burgundy, the transportation of undervalued coins seems to have been a frequent activity as well. As in the case of billonage, arbitrage was noted by Dumas-Dubourg at the beginning of the 15th century. Merchants or moneychangers were operating illegal exchange, keeping the metal and the coins they got from their activities and selling them elsewhere. In 1423, some bullion was confiscated from the moneychanger Odot Molain: «Odot took money from his master's country and went abroad to sell it out of his master's country»³⁹.

The repressive policy of the dukes did not prevent arbitrage on a large scale from occurring between various places of trade. However, contrary to Tuscan moneychangers, coins transportation schemes for their most part operated illegally.

It is important to stress, again, that this arbitrage activity led to driving out undervalued currency. Of course, there was no full disappearance of the good currency as there could be with billonage. But it resulted in an increased scarcity of the good coins as long as the undervaluation persisted. Therefore, arbitrage can be presented as a demonstration of Gresham's law: the locally undervalued currency is driven out.

³⁷ A similar story can be found in Day's work on monetary circulation in medieval Tuscany (Day, 1968). The author shows that the spread in the valuation of florins between two cities had disappeared six month later. This might be the result of Lippo's fellow workers.

³⁸ On other occasions, Lippo also made profit from the lower price of metals prevailing in the cities where he travelled.

³⁹ Dumas-Duburg (1988, p. 177).

5. GRESHAM'S LAW, THE MONEY MARKET AND THE PRINCE

Gresham's law would activate because of a fixed exchange rate between two different moneys. The previous sections suggest that moneychangers were also able to put Gresham's Law into effect without any fixed exchange rates policy. The undervalued currency, for whatever reason it is undervalued –clipping, heterogeneity in prices, a fixed exchange rate, etc.– tends to disappear because moneychangers have more expertise than the rest of the population as to which coin is heavier, and which price is given for each coin in different places.

This analysis, which dates back to contemporary commentators of medieval monetary disorders, leads to a more general interpretation of Gresham's law: within a set of presumably identical coins, Gresham's law triggers the sorting out of the more valuable ones. This greater value may come from: (a) a non-uniform intrinsic content for two coins that must have had the same price –through debasement, wear, clipping, imperfect coinage technique–; (b) a non-uniform price within the exchange area for two identical coins –heterogeneity in the prices of the coins. In both cases, the role played by information was crucial in discerning a profit opportunity. Thus, we define the law so as to cover the cases of billonage and arbitrage. If we stick merely to stating that good coins are said to disappear, then we should indeed include every case of good coins being driven out, melted or exported since each finally reduces the supply of good coins⁴⁰.

Legal tender laws and asymmetric information were the two dominant imperfections on the currency market. They, separately, explain why Gresham's law activated. Under the conditions of a perfect money market, i.e. no legal tenders laws and perfect information, Gresham's law would not be expected to activate. Price adjustments would be more likely than quantity adjustments. One illustration is provided by late 12th century Rome⁴¹. Between 1184 and 1210, two good coins were circulating in Latium: the Provins penny and its imitation minted by the Roman Senate. This local penny was different from the genuine penny because of the slight weakening of its intrinsic value, which was less than 4 per cent. However, this difference was public information and there was no compulsory fixed exchange rate between the two coins. The bilateral exchange rate soon began to adjust and

⁴⁰ Contrary to Akerlof, the analogy between Gresham's law and his lemons' problem is much closer than he thought himself: «But the analogy with Gresham's law is not quite complete: bad cars drive out the good because they sell at the same price as good cars; similarly, bad money drives out good because the exchange rate is even. But the bad cars sell at the same price as good cars since it is impossible for a buyer to tell the difference between a good and a bad car; only the seller knows. In Gresham's law, however, presumably both buyer and seller can tell the difference between good and bad money. So the analogy is instructive, but not complete.» Akerlof (1970, p. 9).

⁴¹ See Toubert (1973).

the good penny started to take precedence on the market. In this example, the existence of a free money market, or at least the possibility to freely evaluate the currencies, allowed both coins to circulate jointly during the first years. Merchants and moneychangers were free to set exchange rates, which is why Gresham's law did not apply: an adjustment by means of prices was possible. Since everybody knew about the intrinsic difference, it prevented a small group of people from being the only ones to take advantage of the situation. The good penny eventually appreciated in even greater proportions than its intrinsic value would have normally allowed it to do. In 1190, the exchange rate established at 3 senatorial pennies for 2 Provins pennies, that is to say at a discount of about 30 per cent. Besides the overvaluation, the Champagne penny became progressively scarcer, further bolstering its value. The good penny was eventually ousted, but this took several years and was due to speculation rather than to arbitrage.

Gresham's law, as the previous sections suggest, was not only well known by the authorities. It was also instrumentalized. The combination of legal tender laws and public information about the mint's policy was sometimes transformed by some well-advised sovereign to set Gresham's law into effect deliberately. Indeed, coining a publicly similar yet slightly lighter currency than that of the neighbouring realm was a good way to attract bullion through the melting down of the rival coins. One blatant example is provided by Henri Laurent's study of 14th century monetary circulation in Brabant and Flanders. In order to surmount the currency war between the Duchess of Brabant and her nephew the Count of Flanders, the Count suggested to his aunt that they should merge their two currencies, and that the resulting currency would be coined in Ghent. Faced with a persistent shortage of precious metal, the Count decided on his own to create a supplementary mint in Malines. In reaction to this, the Duchess had a new mint set up in Vilvorde, charged with minting coins identical to her nephew's, but with slightly less metal. According to Henri Laurent, the currency with the higher content rapidly disappeared. Arbitrage occurred because everybody, not only moneychangers, transported the bullion to the mint that offered the higher price. Not only was arbitrage public information but it was not costly since Vilvorde and Malines were no more than a few miles apart. The Duchess had been clever enough to set up her mint just near her nephew's, thus facilitating the transport of metal from Flanders to her mint.

6. CONCLUSION

In the Middle Ages, Gresham's law was also a matter of information. This article aims at providing evidence to that old story. Testimony from contemporary sources such as scholastics, court reports or monetary ordinances show the role played

by moneychangers in using their private information to make profit on money. In the two scenarios that have been studied in this article –billonnage and arbitrage– the (unofficial) activity of moneychangers always led to the driving out of the undervalued currency. A few people holding some private information is sufficient for undervalued currencies, no matter what the origin of that undervaluation is, to be driven out, exported or melted down. This analysis provides an alternative to the usual legal tender explanation.

Whether picking, culling and arbitrage were widespread is another issue. De Roover asserts that they were not in 14th century Bruges. He refers to the risk that by far out-weighted the benefits, especially for people holding the change for money as a guaranteed income. Moreover, as stressed by Mundell (1998), strong currencies eventually won the battle. However, a review of late medieval monetary ordinances shows that the trafficking of money was often referred to. That Gresham's law was probably activated on a wide scale is also supported by the evolution of Europe's early modern monetary institutions. According to Favreau (1964), in France, by 1450, the activity of the moneychangers was definitively under control as a reaction to the harm they did to the French kings. By then, as indicated by Chevalier (1973), they had to carry certified letters from the Money Chamber, to take an oath and to lay down a guarantee.

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